

Electronic Device Cradle Having Replaceable Latches

BACKGROUND

TECHNICAL FIELD

This invention relates generally to cradles of coupling to portable electronic devices, and
5 more specifically to a cradle capable having a plurality of detachable latches, where the latches
have different geometric dimensions so as to enable the cradle to couple to electronic devices
having different geometric form factors.

BACKGROUND ART

While just a few years ago cellular telephones were a rare and exotic sight, today most
10 everyone owns a cellular telephone. With cellular service rates falling below the rates for
conventional land-line service, more and more people are using cellular telephones to stay
connected with the world. Manufacturers are constantly turning out new phones with new
features, including cameras, color screens and MP3 players.

While each of these new phones includes some common features, one thing that they
15 seldom have in common is their shape. It is rare for phones from different manufacturers to ever
have the same geometric shape, also known as a “form factor”. Even within a single
manufacturer’s product line, phones often have different shapes and sizes. By way of example,
the V60 line of phones manufactured by Motorola includes several phones with slightly different
form factors. For instance, the V60i phone has a slightly different shape from the V60p, even
20 though both are part of the V60 line. Although the two phones both “flip” (i.e. they are fold from
open to closed and vice versa), have curved contours, and look very similar from a distance, the
V60i measures 3.42 x 1.77 x 0.97”, while the V60p measures 3.42 x 1.77 x 1.44”. In other words,
while they may look similar, the V60p is slightly thicker than the V60i.

This plurality of form factors places a heavy burden on the accessory manufacturer. The
25 designers who create holsters, battery chargers, hands-free accessories and vehicular adaptors

must create a unique line of accessories for each phone, as each phone has a unique size and shape. This great number of accessories increases the end cost to the consumer, as the accessory manufacturing plant must change production lines to produce small batches of unique accessories, as opposed to producing a large batch of accessories with a uniform size.

5 There is thus a need for an electronic device accessory that is capable of coupling to multiple electronic devices, even when the multiple electronic devices have different form factors.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a top, front, left, perspective view of a section of a cradle in accordance with
10 the invention.

FIG. 2 illustrates a top, back, right, perspective view of the body in accordance with the invention.

FIG. 3 illustrates one embodiment of a removable latch in accordance with the invention.

FIG. 4 illustrates a second latch in accordance with the invention.

15 FIGS. 5 and 6 illustrate side views of the first latch and second latch, respectively, in accordance with the invention.

FIG. 7 illustrates a perspective view of a rear section of a latch in accordance with the invention.

FIG. 8 illustrates removable latches ready for insertion into a common cradle in accordance with the invention.

20 FIGS. 9 and 10 illustrate the first and second latches each having been coupled to the cradle in accordance with the invention.

FIGS. 11 and 12 illustrate top, left, front, perspective views of latches coupled to the base in accordance with the invention.

FIGS. 13 and 14 illustrate top, right, rear, perspective views of latches coupled to the base in
25 accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

A preferred embodiment of the invention is now described in detail. Referring to the drawings, like numbers indicate like parts throughout the views. As used in the description herein and throughout the claims, the following terms take the meanings explicitly associated
 5 herein, unless the context clearly dictates otherwise: the meaning of “a,” “an,” and “the” includes plural reference, the meaning of “in” includes “in” and “on.”

As illustrated and described herein, a cradle for an electronic device is provided. The cradle, suitable for coupling to a portable electronic device, such as a phone, radio, pager, PDA or MP3 player, has a common body with interchangeable latches. By providing a common body,
 10 accessory design is simplified in that a single part may be used with electronic devices having a variety of form factors, simply by changing the detachable latch. The cradle and latch combination of the present invention is well suited to applications like chargers, power supplies, hands-free vehicular adaptors and car kits. It may equally be applied to holsters and other holding devices as well.

15 Turning now to FIG. 1, illustrated therein is a top, front, left, perspective view of a section of a cradle in accordance with the invention. As used herein, the term “cradle” refers to any pocket-shaped receptacle capable of coupling to a portable electronic device. The cradle includes a body 100 having a latch aperture 101 for receiving a replaceable latch. In one simple embodiment, the aperture 101 and a retention latch catch 102 serve as a means for coupling to
 20 the replaceable latch, as will be shown below.

The aperture 101 sits at the back of a latch recess 103. The latch recess 103 allows the latch to sit within the body 100 flush against an electronic device receiving surface 104. It is best that the latch and receiving surface 104 form a smooth, continuous plane so that the electronic device does not snag upon insertion or removal from the cradle. To better facilitate this smooth
 25 plane, a rear support recess 106 is provided. When the latch is coupled to the body, the rear

support recess 106 provides a rear support mechanism against which the latch may rest. The latch recess 103 also provides alignment guidance when one inserts the latch into the aperture 101.

A rotation support 105 is provided to keep the latch from rotating when inserted into the body 100. As will be described in more detail below, one method of actuating the latch is by using a thumb to bend the latch as a cantilever beam. The rotation support 105 provides an opposing force to the latch, thereby facilitating the cantilever action.

Turning now to FIG. 2, illustrated therein is a top, back, right, perspective view of the body 100. From this view, additional features that assist in coupling the detachable latch to the body 100 may be seen. One such feature is the latch guide 200. The latch guide 200 is a slotted aperture into which a latch arm is inserted. The latch guide 200 performs multiple functions. First, as stated above, it offers alignment assistance when inserting the latch into the aperture 100. Second, once the latch is coupled to the body 100, the latch guide 200 provides lateral stabilization that prevents the latch from moving from side to side.

The retention latch catch 102 is also visible in FIG. 2. In this embodiment, the retention latch catch 102 is essentially an aperture into which a retention latch of the detachable latch seats. The retention latch catch 102 provides the locking function for the detachable latch. Note that one side 201 of the retention latch catch 102 is tapered, while the other side 202 is perpendicular with respect to the body 100.

Turning now to FIG. 3, with reference to FIGS. 1 and 2, illustrated therein is one embodiment of a removable or detachable latch 300 in accordance with the invention. The latch 300 is designed so as to mechanically couple to the body 100, yet to still be easily removable from the body 100. The latch 300 is preferably manufactured out of plastic by way of an injection molding process.

The latch 300 includes a clasp 301 for coupling to a portable electronic device. The clasp 301 of this embodiment is effectively a protrusion extending from the latch 300, which is

designed to mate with a *détente* disposed upon the portable electronic device. A user decouples the clasp 301 by applying a force to the thumb release 302. This, in turn, causes the clasp arm 303 to deform as a cantilever beam. This bending causes the clasp 301 to lift out of the *détente* in the portable electronic device, thereby freeing the device from the cradle.

5 The clasp arm 303 has an associated clasp arm length 304. As will be seen with the discussion of FIG. 4, one way to make the overall cradle accommodate portable electronic devices of differing form factors is by altering the length of the clasp arm 303. As such, the length of the clasp arm 303 in FIG. 3 will be referred to herein as the “first clasp arm length” 304. The first clasp arm length 304 is of a predetermined length suitable for coupling to a first
10 portable electronic device.

 The latch 300 further includes a rear support 305. The rear support 305 fits within the rear support recess 106 of the body 100. The rear support 306 essentially becomes a continuation of the device receiving surface 104, and may provide support to the portable electronic device upon insertion into the cradle.

15 A stabilization support 306 is provided. The stabilization support 306 rests against the back of the device receiving surface 104 in the body 100 of the cradle when the latch 300 is inserted. The stabilization support 306 provides mechanical support when the clasp arm 303 is either coupled to a portable electronic device, or is being actuated as a cantilever beam.

 A latch arm 307 extends from the latch 300 and couples to the retention latch 308. The
20 latch arm and retention latch 308 serve as a means for coupling to the body 100. When the latch 300 is inserted into the aperture 101, it is the latch arm 307 that slides through the latch guide 200. While passing through the latch guide 200, the latch arm actuates as a cantilever beam due to the retention latch 308 moving against the solid surface of the body 100. To ease this insertion, the retention latch 308 includes an insertion ramp 309. The latch 300 couples to the body when
25 the retention latch 308 mates with the retention latch catch 102. Note that the reason for the taper

on one side 201 of the retention latch catch 102 now becomes apparent: it is for mechanically accommodating the insertion ramp 309 of the retention latch 308.

Turning now to FIG. 4, illustrated therein is a second latch 400. Many of the features of the second latch 400, including the second means for coupling to the body 403, are similar or geometrically equivalent to those of the first latch 300. One difference, however, is that the clasp arm 401 of the second latch has a second clasp arm length 402 that is not equal to the first clasp arm length 304. The second clasp arm length 402 is suitable to coupling to a second electronic device having a second form factor. Varying the clasp arm length is one way to accommodate electronic devices having varying form factors. Using the example of the V60i and V60p phones mentioned above, the V60p phone may be accommodated in the same cradle that accommodates a V60i phone simply by replacing the first latch with a second latch having a longer clasp arm length.

Another way to accommodate electronic devices having varying form factors is by way of the clasp. Note that the clasp 404 of the second latch 400 is geometrically equivalent to the clasp 301 of the first latch 300, in that the clasps 404,301 are essentially protrusions extending from their respective clasp arms 401,303. Another way to accommodate multiple electronic devices is to make the clasps 404,301 geometrically dissimilar. For example, one clasp may be a rectangular protrusion, while the other clasp may actually be a concave détente capable of receiving a protrusion disposed on the electronic device. It will be clear to those of ordinary skill in the art having the benefit of this disclosure that a wide variety of latches may be made by using a common means for coupling to the housing and dissimilar clasp means. By way of example, one clasp or latching means may include a lock, while another might include a buckle, and so forth.

Turning now to FIGS. 5 and 6, illustrated therein are side views of the first latch 300 and second latch 400, respectively. From the side views, it is easier to see that the second clasp arm

length 402 is not equal to the first clasp arm length 304. In these exemplary embodiments, the clasp arms 303,401 both have compound curvatures. In particular, the convex curvature 600 of the second latch 400 has been extended as compared to the first convex curvature 500, thereby rendering the second clasp arm length 402 longer than the first clasp arm length 304.

5 Turning now to FIG. 7, illustrated therein is a perspective view of a rear section 700 of a latch in accordance with the invention. As the means for coupling to the body of any of the latches are geometrically equivalent (so as to couple to a common base), the rear section of the latch will generally be of the same geometry regardless of the clasp that is being used. It is generally preferable to include at least one stress stabilizer 701,702 to the rear section 700 of the
10 latch, especially when the clasp arm is being employed as a cantilever beam. The stress stabilizers 701,702, while optional, provide support to the latch and prevent unwanted wear and cracking.

 Turning now to FIG. 8, illustrated therein are removable latches 300,400 ready for insertion into a common cradle 801. The cradle 801 includes a body 100 having at least one
15 pocket 802 for receiving an electronic device. The pocket 802 may include mechanical and electrical connectors for providing power and data communications to the electronic device. The body 100 further includes a latch receiving means 803 that may include the features recited in the discussion of FIGS. 1 and 2 above.

 The latches 300,400 include a first and second means of coupling to the body 800,403,
20 respectively. As the latch receiving means 803 is common, the first and second means of coupling to the body 800,403 are geometrically equivalent. With each latch 300,400, the retention latch 308 and retention latch arm 307 will be inserted into the latch guide 200 until the retention latch 308 mates with the retention latch catch 102. This mating allows the rear support 305 to become coplanar with the electronic device receiving surface 104.

Turning now to FIGS. 9 and 10, illustrated therein are the first and second latches 300,400 each having been coupled to the cradle 801. In these configurations, each latch 300,400 is detachable from the body 100 simply by depressing the retention latch 308 into the body 100 and sliding the respective latches 300,400 out and away from the body. As such, when the first detachable latch 300 is coupled to the body 100, the body 100 is capable of coupling to a first portable electronic device having a first form factor. When the second detachable latch 400 is coupled to the body 100, the body is capable of coupling to a second portable device having a second form factor.

Turning now to FIGS. 11 and 12, illustrated therein are top, left, front, perspective views of latches 300,400 coupled to the base 100. Note that the rear support 305 of each latch 300,400 is generally coplanar with the device receiving surface 104 so as to be capable of providing support to the electronic device. Note also that the retention latch 308 is seated within the retention latch catch 102, thereby securely coupling each latch 300,400 to the body 100.

Turning now to FIGS. 13 and 14, illustrated therein are top, right, rear, perspective views of latches 300,400 coupled to the base 100. From this angle, the stabilization support 306 can be seen seated against the rear 1300 of the body 100. Note also that the latches 300,400 are situated such that they rest against the rotation support 105. As such, when a user presses upon the thumb release 302, thereby actuating the clasp arms 303,401 as cantilever beams, the rotation support 105 is able to provide an opposing force, thereby allowing the clasp 301 to release the portable device held within the cradle.

While the preferred embodiments of the invention have been illustrated and described, it is clear that the invention is not so limited. Numerous modifications, changes, variations, substitutions, and equivalents will occur to those skilled in the art without departing from the spirit and scope of the present invention as defined by the following claims.